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[研究文章 Research Article]

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Taxonomic Notes of *Hesperosoma* (*Hemihesperosoma*) *miwai* (Bernhauer, 1943) with Observations of Uncommon Behavior (Coleoptera: Staphylinidae)

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Abstract. Since its original description in 1943, *Hesperosoma* (*Hemihesperosoma*) *miwai* (Bernhauer, 1943) has been redescribed by multiple authors (Hayashi, 1993a; Schillhammer, 2015), albeit without having seen the type specimen. In our study, the holotype specimen of *Amichrotus miwai* Bernhauer, 1943 was examined, and it was concluded that all subsequent redescriptions of this species are in line with its type specimen. We also provide additional distribution data for *H.* (*Hem.*) *miwai*, confirming that this species is endemic and widespread throughout the island of Taiwan. In addition, a possible phytophagous behavior was discovered during field observations. The plant-associated behavior of several Staphylininae species is also discussed within our study.

Key words: Rove beetle, Staphylininae, Staphylinini, Anisolinina, *Alocasia odora*, type specimen, distribution, bionomics, field observation, Taiwan

Introduction

Hesperosoma (*Hemihesperosoma*) *miwai* (Bernhauer, 1943) is a species of rove beetle endemic to Taiwan. The species was first described by Bernhauer (1943), originally in the genus *Amichrotus*. Shibata (1976) accepted the generic concept of Bernhauer and described another new species of *Amichrotus* from Taiwan. Later, Hayashi (1993a) placed *Hesperosoma* in his newly established the subtribe Anisolinina, and moved *A. miwai* to the genus *Hesperosoma*, redescribing this species. In that same year, Hayashi (1993b) described a subspecies of *H. miwai* (*H. miwai nanshanchiana*) and *H. sakoi* based on limited material. Schillhammer (2009) synonymized both *H. miwai nanshanchiana* and *H. sakoi* as *H. miwai* based on a series of specimens. Schillhammer (2015) redescribed *H. miwai* in his revision of *Hemihesperosoma*. However, both authors (Hayashi, 1993a and Schillhammer, 2015) did not examine the type specimen of *A. miwai*.

Most Staphylininae are thought to be exclusively predacious on other invertebrates, with only a few examples of phytophagy having been observed in this subfamily (Thayer, 2016). In some cases, phytophagous staphylinines are also presumed to be pollinators, based on mandibular modifications, and the fact that they are frequently collected from flowers (Smetana, 1971, 2002, 2012, 2015). García *et al*. (2012) reported *Philonthus quisquiliarius* (Gyllenhal, 1810) to be the first known case of a zoophytophagous staphylinine, i.e. a principally zoophagous (predacious) animal that occasionally exhibits phytophagous behaviour within a single life stage (Coll & Guershon, 2002).

Based on limited collection data, staphylinines in the subtribe Anisolinina are thought to occur in various forest floor habitats such as in leaf litter, on fungi, or under large fallen trees, although the majority of specimens have been collected in flight intercept traps (Shibata, 1976; Schillhammer, 2004, 2009, 2015, 2018; Tang, 2019). Schillhammer (2004) briefly mentioned that some specimens of *Hesperosoma* were collected from mushrooms on decaying trees in mountain forests, hunting for larvae feeding on the mushrooms; he suggested that this habitat requirement likely applies to most members of the *Anisolinus* lineage. However, based on collection data, some members of *Hesperosoma* seem to switch to other microhabitats (e.g. *H.* (*Hesperosoma*) *puetzi* was collected by sifting in a spring-fed swamp or mixed shrubs and grassland (Schillhammer, 2004, 2009); *H.* (*Hes.*) *tarasovi* was collected by fogging in montane rainforest (Schillhammer, 2009); *H.* (*Hem.*) *pederseni* was collected in a fruit-baited trap on the ground (Schillhammer, 2009).

In the present paper, the first author examined the type specimen of *A. miwai*. Based on field observations, we aim to report on the association between *H. miwai* and the plant *Alocasia odora* (Alismatales: Araceae). Additional distributional data for *H. miwai* is also provided.

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Materials and methods

Images of the type specimen and labels were taken using an Olympus OM-D E-M1 digital camera with an Olympus M.Zuiko Digital ED 30mm F3.5 Macro lens. The image of the type specimen was montaged using the Z-stacking technique; the method followed that described in Hu & Ho (2019). Images of live specimens were either taken using a Nikon D500 digital camera with a 105mm f2.8 Micro Lens and Phottox Mitro+ Flash, or using an HTC U11+ smartphone. The habitat image was taken using a Nikon D500 digital camera with an 18-55 mm f3.5-5.6 Lens and Phottox Mitro+ Flash. Images were edited in Adobe Photoshop CS5 as needed. Formatting of plates was done in Adobe Illustrator CS5 and PhotoCap 6.0. For the collection data, double slash (//) is used to separate different labels, while supplementary data are provided in square brackets ([]).

Depositories.
FMNH — Field Museum of Natural History, Chicago, USA (C. Maier, A. F. Newton, M. Thayer).
FSHc — Fang-Shuo Hu, private collection, Taichung, Taiwan.
NMNS—National Museum of Natural Science, Taichung, Taiwan (J.-F. Tsai).
TARI — Taiwan Agricultural Research Institute, Taichung, Taiwan (C.-F. Lee).

Results

Hesperosoma miwai (Bernhauer, 1943)

(Figs. 1–2)

Type material. Holotype (male) (Fig. 1) by monotypy, in FMNH: Formosa, Arisan [=Alishan=阿里山], 1918//X 2 – 23. J. Sonsan, M. Yoshino//amichrotus miwai Bernh Typ.//miwai Bernh, typus amichrotus [red label]//Chicago NHMus. M. Bernhauer Collection. The specimen is in poor condition, separated in three parts (head, thorax and abdomen). All parts of the specimen are mounted on a card. Most segments of both antennae and tarsi of the left hind leg and right middle leg are missing, as well as the distal two tarsomeres of the left middle leg. Both hind wings are sticking out from the elytra, part of right hind wing is attached to the terminal segment of abdomen. The holotype specimen of *Amichrotus miwai* fits all descriptions from previous authors (Bernhauer, 1943; Hayashi, 1993b; Schillhammer, 2015).

Additional material. TAIWAN: Hualien County: 1 spec., 台 8 線 140.5~141K (8C-1), 05.VII.2010, leg. W.-P. Chan (TARI); 1 spec., 台 8 線 158~158.5K (5B-1), 05.X.2010, leg. W.-P. Chan (TARI); 1 spec., same data as previous one except (5A-1), 09.X.2010 (TARI); 1 spec., same collection data as preceding, 12.VI.2010 (TARI); 1 spec., 台 8 線 164~164.5K (4A-1), 27.VI.2010, leg. W.-P. Chan (TARI); 1 spec., same data as previous one except (4B-3), 19.VI.2010 (TARI); 1 spec., Pulowan (布洛灣) (2B-2), 20.III.2010, leg. W.-P. Chan (TARI); 1 spec., same data as previous one except (2A-1), 04.XII.2010 (TARI); 1 spec., Loshao (洛韶), 07-14.IV.2007, leg. Y.-F. Hsu// *Hesperosoma miwai* (BERNHAUER) det. Schillhammer '09 (TARI). Nantou County: 1 spec., Jenai Sungkang [仁愛 松崗], VI/17/1998, C.C.Lo (NMNS); 4 spec., Shitou (溪頭), 12.V.2005, leg. C.-F. Lee// *Hesperosoma miwai* (BERNHAUER) det. Schillhammer '09 (TARI); 1 spec., same data as previous ones except 7.IV.2005 (TARI). New Taipei City: 1 spec., FORMOSA, Aode [=澳底], 27-IX-1938, COL. Y. MIWA (TARI). Yilan County: 7 spec., Linmei (林美), 24.8207, 121.7214, ca. 510m, Jiaoxi To., 04~11-III-2018, leg. F. S. Hu by FIT (FMNH, FSHc); 1 spec., Fushan Botanical Park [福山植物園], 19-26.VI.2006, leg. C.-S. Tung (TARI). Yunlin County: 2 males and 3 females, Jiananyun Peak (嘉南雲峰), alt. 1795m, 30.VIII.2018, in rotten bamboo, leg. C. R. Chen (FSHc). Pingtung County: 1 male, Tai-wu, Tai-wu 泰武, 1200m, 2019,II-19, Y. T. Chung Leg. CCCC (FSHc).

Distribution.

Hesperosoma miwai is endemic and widespread in Taiwan. Based on previous studies (Bernhauer, 1943; Shibata, 1976; Naomi, 1982; Hayashi 1993a; 1993b; Schillhammer, 2009; 2011; 2015) and this paper, this species is recorded from Chiayi County, Hualien County, Nantou County, New Taipei City, Taoyuan City, Taitung County, Yilan County and Yunlin County, presumably occurring in mountainous areas of Taiwan Island.

Bionomics.

As with most other *Hesperosoma* spp., *H. miwai* are usually collected using flight intercept traps. A series of specimens from Jiananyun Peak were collected from rotten bamboo. Based on collection data, *H. miwai* has been collected from relatively low elevations (e.g. Linmei, alt. 510 m) to relatively high elevations (e.g. Jiananyun Peak, alt. 1795 m).

Description of behavior based on field observations.

While live specimens of *H. miwai* are roosting or moving, the mandibles are always closed and overlapping (Fig. 2A). However, based on a field observation made by the second and third authors in Defulan Trail, Taichung City (24.1805, 120.9762), a live specimen of *H. miwai* was found inside the base of a decaying stem of a still live *Alocasia odora* (Fig. 2C); this individual was observed biting the decaying stem (Fig. 2B) several times over a period of a few seconds. Shortly after, this individual escaped, and was thus unable to be vouchered, however, since there are no similar *Hesperosoma* spp. known in Taiwan, the identification is assumed to be correct.

A series of *H. miwai* specimens were collected from Jiananyun Peak, Yunlin County (23.6037, 120.7246) by the fourth author. These specimens were found inside decaying bamboo (Fig. 2D). Two males and three females were collected at the same time: see 'Additional material' below for details. Both observations suggest that *H. miwai* presumably has a close association with decaying plant material.

Figure 1. Type specimen and labels of *Amichrotus miwai* Bernhauer, 1943.

Figure 2. Live specimens of *H. miwai* (Bernhauer, 1943) and its microhabitats. A - Live roosting specimen of *H. miwai* with closed mandibles; B - Live specimen of *H. miwai* biting rotten stem of *Alocasia odora*; C - The rotten stem of *A. odora*; D - Live specimen of *H. miwai* found in rotten bamboo.

Discussion

There are few reports in the literature of rove beetles of the subfamily Staphylininae utilizing different sources of plants. Frank & Barrera (2010) reported adults of *Belonuchus* spp. and *Odontolinus fasciatus* hunting lepidopterous or dipterous larvae in water-filled flower bracts of various species of *Heliconia* (Zingiberales: Heliconiaceae). Rodríguez & Navarrete-Heredia (2016) described a new species of *Belonuchus* which was collected from rotten Agavoideae (Asparagales: Asparagaceae); the type series of *Philonthus euphorbiarum* was collected from the trunk of dead *Euphorbia officinarum* (Malpighiales: Euphorbiaceae); specimens of *Smilax lynchi* have been collected under fallen fruit (Chatzimanolis, 2016).

In our observation, *H. miwai* was biting the rotten stem of *Alocasia odora*. In fact, a similar behavior has been observed in *B. cephalotes* (see Frank & Barrera: Fig. 7) but the authors did not explain this behavior in detail. Though the feeding behavior of *H. miwai* was not observed directly, one may assume this specimen was feeding on the sap of the decaying stem of the *A. odora*. Both our observations suggest that *H. miwai* is also associated with decaying plant material. Answering the question of whether *H. miwai* really is a zoophytophagous species will require confirmation through more detailed observations and experiments. Our study provides a preliminary record for further natural history studies of this species.

Acknowledgments

The authors thank all collectors and curators listed who made material available. The first author also thanks Alfred Newton (Field Museum of Natural History, Chicago, USA) for providing useful literature.

References

Bernhauer, M. 1943. Neuheiten der palaearktischen Staphylinidenfauna Zugleich 15 (Beitrag zur japanisch-chinesischen Fauna). *Mitteilungen der Münchner Entomologischen Gesellschaft e.V.* 13 (1): 169–188.

Chatzimanolis, S. 2016. A revision of the myrmecophilous genus *Smilax* Laporte (Coleoptera: Staphylinidae: Staphylininae). *Zootaxa* 4162 (2): 283–303.

Coll, M. & Guershon, M. 2002. Omnivory in terrestrial arthropods: Mixing plant and prey diets. *Annual Review of Entomology* 47: 267–297.

Frank, J. H. & Barrera, R. 2010. Natural history of *Belonuchus* Nordmann spp. and allies (Coleoptera: Staphylinidae) in *Heliconia* L. (Zingiberales: Heliconiaceae) flower bracts. *Insecta Mundi* 110: 1–12.

García, M., Farinós, G. P., Castañera, P & Ortego, F. 2012. Digestion, growth and reproductive performance of the zoophytophagous rove beetle *Philonthus quisquiliarius* (Coleoptera: Staphylinidae) fed on animal and plant based diets. *Journal of Insect Physiology* 58: 1334–1342.

Hayashi, Y. 1993a. Studies on the Asian Staphylininae, I (Coleoptera, Staphylinidae). *Elytra, Tokyo* 21(2): 281–301.

Hayashi, Y. 1993b. Notes on Staphylinidae from Taiwan, IX (Coleoptera). *Entomological Review of Japan* 48 (2): 123–126.

Hu, F.-S. & Ho, B.-H. 2019. *Coptotermes gestroi*: an invasive pest discovered in Eastern Taiwan for the first time (Blattodea: Rhinotermitidae). *Taiwanese Journal of Entomological Studies* 4 (3): 24–28.

Naomi, S. 1982. Description of a new subgenus *Paramichrotus* of the genus *Amichrotus* Sharp from Taiwan (Coleoptera: Staphylinidae). *Transactions of the Shikoku Entomological Soceity* 16 (1-2): 37–39.

Peyerimhoff, P. de. 1949. Études et descriptions de Coléoptères Marocains. II. *Bulletin de la Société des Sciences Naturelles du Maroc* 25-27: 248–308.

Rodríguez, W. D. & Navarrete-Heredia, J. L. 2016. A new Mexican species of *Belonuchus* Nordmann (Coleoptera, Staphylinidae). *Zootaxa* 4083 (3): 444–450.

Schillhammer, H. 2004. Critical notes on the subtribe Anisolinina with descriptions of nine new species. *Koelopterologische Rundschau* 74: 251–277.

Schillhammer, H. 2009. Additional notes on the subtribe Anisolinina, with description of seven new species. *Koleopterologische Rundschau* 79: 83–96.

Schillhammer, H. 2015. Subgenus *Hemihesperosoma* Hayashi of *Hesperosoma* Scheerpeltz reinstated and revised (Coleoptera: Staphylinidae: Staphylininae). *Koleopterologische Rundschau* 85: 121–165.

Schillhammer, H. 2018. Five new species of the subtribe Anisolinina (Coleoptera: Staphylinidae: Staphylininae). *Koleopterologische Rundschau* 88: 43–57.

Shibata, Y. 1976. The Taiwanese species of *Amichrotus* Sharp, with description of a new species (Coleoptera, Staphylinidae). *Entomological Review of Japan* 29 (1/2): 10–14.

Smetana, A. 1971. Revision of the tribe Quediini of America North of Mexico (Coleoptera: Staphylinidae). *Memoirs of the Entomological Society of Canada* 79: 1–303.

Smetana, A. 2002. Contributions to the knowledge of the Quediina (Coleoptera, Staphylinidae, Staphylinini) of China Part 21. Genus *Quedius* Stephens, 1829. Subgenus *Raphirus* Stephens, 1829. Section 4. *Elytra, Tokyo* 30 (1): 119–135.

Smetana, A. 2012. Two species of the genus *Quedius* Stephens, 1829, subgenus *Microsaurus* Dejean, 1833, new to the fauna of Vietnam (Coleoptera, Staphylinidae, Staphylinini, Quediina). *Studies and Reports, Taxonomical Series* 8 (1-2): 315–320.

Smetana, A. 2015. Contributions to the knowledge of the Quediina (Coleoptera: Staphylinidae: Staphylinini) of China Part 50. Genus *Anthosaurus* gen. nov. *Studies and Reports, Taxonomical Series* 11 (1): 175–180.

Tang, L. 2019. On the genus *Philomyceta* of China (Coleoptera: Staphylinidae: Staphylininae). *Acta Entomologica Musei Nationalis Pragae* 59 (1): 133–137.

Thayer, M.K. 2016. Staphylinidae Latreille, 1802. pp 394–442. In: Beutel, R.G. & Leschen, R.A.B. (eds). Handbook of Zoology; Arthropoda: Insecta, Coleoptera, Beetles. Vol. 1: Morphology and systematics (Archostemata, Adephaga, Myxophaga, Polyphaga partim), second edition. De Gruyter, Berlin/Boston.

三輪鐮顎隱翅蟲分類補述與罕見行為觀察（鞘翅目：隱翅蟲科）

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摘要: 三輪鐮顎隱翅蟲 *Hesperosoma miwai* (Bernhauer, 1943) 已經被重複描述數次，但模式標本卻從未被重新檢查，本篇文章重新檢查三輪鐮顎隱翅蟲的模式標本，所有重新描述皆符合模式標本。本文亦更新本種的分布資訊，確認本種為特有種且廣布於臺灣本島。本文亦報導了此種可能的取食植物行為，並與其他隱翅蟲亞科 (Staphylininae) 物種的類似行為一併討論。

關鍵詞: 隱翅蟲、隱翅蟲亞科、隱翅蟲族、岐隱翅蟲亞族、姑婆芋、模式標本、分布、生物學資訊、野外觀察、臺灣

[研究文章 Research Article]

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Notes on Uncommon and Newly Recorded Geometrid Moths of Taiwan (Lepidoptera: Geometridae). Part 1

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Abstract. This study represents the first in a series of papers which aim to elucidate the taxonomic and distributional issues of uncommon and unrecorded geometrid moths of Taiwan. Nine species are included, with six newly recorded: *Eucyclodes infracta* (Wileman, 1911); *Megabiston plumosaria* (Leech, 1891); *Hypomecis hyposticta* (Wehrli, 1925); *Eilicrinia nuptaria* Bremer, 1864; *Apochima excavata* (Dyar, 1905) and *Planociampa chlora* Yazaki & Wang, 2003. The recommended or newly proposed Chinese common names are also given, with comments, for four geometrid species that occur in Taiwan, i.e. *H. hyposticta*, *Xyloscia dentifera* Inoue, 1986, *E. nuptaria*, *A. praeacutaria* (Inoue, 1976).

Key words: Fauna, species richness, continental island, Oriental region, Indo-Australian region

Introduction

The geometrid moths represent the largest family of Lepidoptera and the most commonly used group for assessing regional Lepidoptera species numbers, e.g. Scoble *et al*. (1995), Choi, (2006), Paknia and Rajael (2015), for understanding the diversity and faunal composition along environmental gradients, e.g. Brehm and Fiedler (2003), Axmacher *et al*. (2004), and for sampling in large-scale evolutionary and ecological studies, e.g. Axmacher and Fiedler (2008), Chen *et al*. (2009), Välimäki *et al*. (2013), Heidrich *et al*. (2018), Xing *et al*. (2018), Wu *et al*. (2019). The most recent records indicate that there are 327 genera and 872 species found in Taiwan (TaiCOL, 2020), representing about one-fifth of the Taiwanese moth fauna. The present study, representing the first in series, aims to further document the species richness and distribution patterns of relatively uncommon geometrid species of Taiwan for ecological and conservation purposes. We also propose new Chinese common names for some Taiwanese geometrid species based on the updated information of their systematic position, where necessary.

Materials and methods

The specimens were examined or borrowed from the following institutions:

CCMF – Collection of Chien-Ming Fu, Taichung.

CHRT – Collection of Han-Rong Tzuoo, Nantou.

CRS – Collection of Rikio Sato, Niigata.

NTM – National Taiwan Museum, Taipei.

NMNS – National Museum of Natural Science, Taichung.

HNHM – Hungarian Natural History Museum, Budapest.

TFRI – Insect collection of Taiwan Forestry Research Institute, Taipei.

Genitalia preparations for morphological studies

Genitalia were prepared following the general method described by Betts (1987) with slight modifications. After maceration of the abdomen in 10% KOH and subsequent cleaning, male genitalia were carefully removed from the abdomen, and abdominal segments 1–8 were opened along the caudocephalic axis from the right side. Female genitalia were removed entirely from the abdomen,

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cleaned and mounted ventral side uppermost. All of the membranous genital tubes and bursae derived from the genital openings were preserved. Genitalia and abdominal skins of both sexes were stained with pen ink (Pilot brand), preserved in 70% ethanol, and then transferred to 99.5% ethanol before being slide mounted in Euparal. Specimens were photographed using a Nikon D600 digital camera and slides were photographed using a Nikon D500 digital camera with flash.

Chinese species common names

The newly proposed Chinese common names for selected geometrid species, with comments, are marked with an asterisk.

Results

***Timandromorpha enervata* Inoue, 1944**

小缺口鐮翅青尺蛾

(Fig. 1a)

Timandromorpha enervata Inoue, 1944, *Trans. Kansai ent. Soc.* 14 (1): 63, text-figs 4, 5; Chang, 1990a: 59, fig.; Inoue, 1992: 120; Fu *et al*., 1995: 29; Wang, 1997: 55, figs; Kim *et al*., 2001: 20, fig. 8, pl. 1: 7.
Timandromorpha discolor: Shin, 1983: 176, pl. 2, *nec* Warren, 1896.
Timandromorpha discolor enervata: Inoue, 1961: 37; Inoue, 1982, 1: 430, 2: pl. 57.

Specimens examined. TAIWAN: 1♂, Hsinchu Co., Yulao, 1,400 m, 7. V. 2016, leg. S. Wu & J. C. Huang (TFRI); 1♀, Taichung Co., Baxianshan, 1,000 m, 18. IX. 1993, leg. C. M. Fu (CCMF).

Distribution. Japan, Taiwan, North India and North Borneo (Kim *et al*., 2001).

Bionomics. This species is restricted to the mid-elevation broadleaf forests of Northern and Central Taiwan. Based on current records, the adults can be found in May and September.

Note. The species is common in South East Asia but is rare in Taiwan.

***Eucyclodes infracta* (Wileman, 1911)**

彎彩翠尺蛾

(Figs 1b, 2a, 2g)

Thalassodes infracta Wileman, 1911, *Trans. ent. Soc. Lond.*, 1911: 342, pl. 30, fig. 16.
Chloromachia infracta: Prout, 1912, *in* Wystman, *Genera Insectorum*, 129: 251.
Eucyclodes infracta: Holloway, 1996: 23, 235; Han & Xue, 2011: 526, figs 366, 685, 880, pl. 19: 15; Nakajima, 2011: 209, pl. 43:1, 2.

Specimens examined. TAIWAN: New Taipei City: 1♀, Wanli, Gueiho, 12. X. 2014, leg. J. J. Cherng (TFRI); 2♂♂, Shuangxi, Taiping, 12. VIII. 2015, A. P. Cheng (TFRI).

Distribution. Japan, China (Han & Xue, 2011); Taiwan (new record).

Bionomics. Two specimens were collected in Northern Taiwan. Based on current records, the adults can be found in August and October.

Note. The type locality of this species is Honshu, Japan. There are no remarkable differences between the genitalia (in both sexes) of Chinese and Taiwanese specimens (Han & Xue, 2011). The Chinese common name follows Han & Xue (2011).

***Megabiston plumosaria* (Leech, 1891)**

羽霾尺蛾

(Figs 1c, 2b)

Biston plumosaria Leech, 1891, *Entomologist* 24 (suppl.): 43.
Megabiston plumosaria: Inoue, 1982: 555, pl. 99: 18, 19; Kim *et al*., 2001: 139, fig. 159, pl. 14: 21, 22; Sato & Kawakami, 2001: 262, figs 15, 17-19; Sato & Fan, 2011: 121, pl. 20: 1.
Boarmia theae Matsumura, 1917, *Oyo-Konchu-Gaku* 1: 603, pl. 27, fig. 5.

Specimens examined. TAIWAN: 1♂, Taoyuan Co., Shihleng, 29. XII. 1988, leg. H. Y. Wang (NTM); 1♂ Ilan/Taoyuan Prov., Fuhsing district, Xicun, 1,106 m, 24°38'33"N, 12°26'42"E, 9. II. 2018, leg. Balázs Benedek (HNHM); 1♂, same collecting locality, 12–13. II. 2018 (HNHM); 1♂, same collecting locality, 19. II. 2018 (HNHM); 1♂, Ilan Co., Fushan, 17. I. 1990, leg. Y. B. Fan, slide TFRI 71713 (TFRI).

Distribution. Japan, Korea, China, Russia (Kim *et al*., 2001; Sato & Fan, 2011); Taiwan (new record).

Bionomics. This species occurs in low to mid-elevation broadleaf forests in Northern Taiwan. Based on current records, the adults occur during December and next February.

Note. The type locality of this species is Honshu, Japan. There are no remarkable differences between the genitalia (in both sexes) of Chinese and Taiwanese specimens (Han & Xue, 2011). The Chinese common name follows Sato & Fan (2011).

***Hypomecis hyposticta* (Wehrli, 1925)**

墨褐尺蛾*、超小土尺蛾

(Figs 1d, 1e, 2c, 2h)

Boarmia hyposticta Wehrli, 1925, *Mitt. münch. ent. Ges*. 15 (1–5): 58, pl. 1: 21.
Hypomecis hyposticta: Parsons *et al*., 1999: 474; Sato & Fan, 2011: 64, pl. 8: 12.

Specimens examined. TAIWAN: 3♂♂, Pintung Co., Shouka, 450 m, 8. IX. 2011, leg. Y. C. Lin (TFRI); 6♂♂1♀, same collecting locality, 27. X. 2011, leg. Y. C. Lin, slide TFRI157135♀ (TFRI); 2♂♂, same collecting locality, 24. XI. 2011, leg. Y. C. Lin, slide TFRI142182♂ (TFRI); 1♂, same collecting locality, 20. XII. 2011, leg. Y. C. Lin (TFRI); 3♂♂, same collecting locality, 22. XII. 2011, leg. Y. C. Lin (TFRI); 5♂♂, same collecting locality, 1. II. 2012, leg. Y. C. Lin (TFRI); 6♂♂, same collecting locality, 22. III. 2012, leg. Y. C. Lin (TFRI); 2♂♂, same collecting locality, 24. V. 2012, leg. Y. C. Lin (TFRI); 2♂♂, same collecting locality, 19. VI. 2012, leg. Y. C. Lin (TFRI); 1♂, same collecting locality, 15. VIII. 2012, leg. Y. C. Lin (TFRI); 3♂♂, same collecting locality, 13. IX. 2012, leg. Y. C. Lin (TFRI); 1♂, same collecting locality, 16. X. 2012, leg. Y. C. Lin (TFRI); 6♂♂, same collecting locality, 13. XII. 2012, leg. Y. C. Lin (TFRI).

Distribution. China (Sato & Fan, 2011); Taiwan (new record).

Bionomics. In Taiwan, this species has only been collected from Shouka in the southeastern region. The adults have been collected in almost every month of the year, with the exception of January and July, based on monthly survey during 2011–2012.

Note. The type locality of this species is Southern China. Based on information kindly provided to us by Dr. Rikio Sato (Niigata), the male genitalia of Taiwanese specimens are known to conform with those collected in the Nanling Mountains (genitalia slide: RS-6363 in CRS). The Chinese common name ”超小土尺蛾” has been given in Sato & Fan (2011); herein we propose a new common name to unify the generic common name used in Taiwan.

***Xyloscia dentifera* Inoue, 1986**

銳齒木尺蛾*、銳齒枝尺蛾、缺角尺蛾

(Fig. 1f)

Xyloscia dentifera Inoue, 1986, *Bull. Fac. domest. Sci. Otsuma Wom. Univ*. 22: 254, figs 52, 53; Chang & Fan, 1989: 19; Chang, 1990b: 136, fig.; Fu *et al*., 1995: 26, pl. 1: 13; Wang, 1998: 357, fig.; Parsons *et al*., 1999: 978.

Specimens examined. TAIWAN: 1♂, Hsinchu Co., Yulao, 1,500 m, 27. IV. 2014, leg. C. G. Lai (TFRI); 1♂, same collecting locality, 21. V. 2015, leg. C. G. Lai (TFRI); Taichung Co., 1♂, Daxueshan Forest Road 22 km, 1,500 m, 14. IV. 2007, leg. C. M. Fu (CCMF); 1♂, Taichung Co., Baxianshan, 1,000 m, 1. X. 1994, leg. C. M. Fu (CCMF); 1♀, same collecting locality, 5. XI. 1994, leg. C. M. Fu (CCMF); Nantou Co., Dongpu, 19. IV. 1985, leg. B. S. Chang (NMNS); 1♂, same collecting locality, 23. II. 1991, leg. H. R. Tzuoo (CHRT); 1♂, Nantou, Meifeng, 27–28. VIII. 1991, leg. C. S. Lin (NMNS); 2♂♂, Kaohsiung City, Liguan, 1,800 m, 19. IV. 2017, leg. Fu & Cheng (CCMF).

Distribution. Taiwan (Inoue, 1986).

Bionomics. This species is distributed in mid-elevation broadleaf forests. The adults have been collected from February–May, in August, and from October–November.

Note. We follow the generic common name, 木尺蛾, in National Science Data Infrastructure of Forestry (2020) and propose a recommended specific common name.

***Eilicrinia nuptaria* Bremer, 1864**

尖耳蟢尺蛾

(Figs 1g, 1h, 2d, 2i)

Eilicrinia nuptaria Bremer, 1864, *Mem. Acad. Sci. St. Petersb*. (7) 8 (1): 80, pl. 7: 5; Vojnits *et al*., 1994: 17; Beljaev & Park, 1998: 253; Parson *et al*., 1999: 263; Kim *et al*., 2001: 170, pl. 18: 21; Kim *et al*., 2016: 193, fig. 249.
Eilicrinia opthalmicata Wehrli, 1927, *in Bang-Haas, Horae macrolepidopt. Reg. palaeact*. 1: 96, pl. 11, fig. 34.

Specimens examined. KOREA: 1♂, Prov. Gang-von district, On-dzong, Kum-gang san, near Hotel Go-song, 250 m, No. 325, 7. VIII. 1975, leg. J. Papp & A. Vojnits, slide HNHM2010–03675 (HNHM); 1♀, Prov. North Pyongar, Mt. Myohyang-san, Hotel Myohyang-san, No. 793, 14. II. 1982, leg. Dr. L. Forró & L. Ronkay, slide HNHM2010–03684 (HNHM). **TAIWAN:** 1♂, Hualien Co., Ci'en, 1,995 m, 13. VIII. 2012, S. Wu & W. C. Chang (TFRI); 2♀♀, same collecting locality, 25. V. 2012, S. Wu & W. C. Chang (TFRI).

Distribution. Russia, the Korean Peninsula (Kim *et al*., 2001); Taiwan (new record).

Note. Having dissected the genitalia (of both sexes) of both Korean and Taiwanese specimens, no remarkable difference in morphology were observed. This species has a peculiar distribution pattern since currently there are no records from either China or Japan to fill the geographical gaps between Korea, Russia and Taiwan. The proposed recommended species common name refers to the generic common name, 蟠尺蛾, in Fang (2003) and the specific name, 뾰족귀무늬가지나방 (point-eared moth), in Kim *et al*. (2016).

Apochima excavata (Dyar, 1905)

桑摺翅尺蛾

(Figs 1i, 2e)

Acanthocampa excavata Dyar, 1905, *Proc. U. S. natn. Mus.* 28: 952, figs 17, 18.
Zamacra excavata: Inoue, 1941: 27; Inoue, 1946: 45; Inoue, 1956: 339, no. 1695; Inoue, 1977: 305; Chu, 1981: 129.
Apochima excavata: Inoue, 1982: 554; Shin, 1983: 1001; Lu, 1991: 123, fig. 176; Kim & Shin, 1996: 19; Parsons *et al*., 1999: 56; Kim *et al*., 2001: 139, fig. 110, pl. 14: 19; Sato, 2011: 177, pl. 27:9, 10.

Specimen examined. TAIWAN: 1♂, Taoyuan County, Xicun, 1,106 m, 9. II. 2018, leg. B. Benedek (HNHM).

Distribution. Japan, Korea, China (Sato, 2011); Taiwan (new record).

Bionomics. This species is common outside of Taiwan, but within Taiwan, it appears to be rare, and is restricted to Northern Taiwan.

Note. The male genitalia of Taiwanese specimens are not distinctly different from those of Korean specimens (see Kim *et al*., 2001: 139, fig. 110). The recommended generic and specific recommended common names follow Lu (1991).

Apochima praeacutaria (Inoue, 1976)

尖嘴摺翅尺蛾*、尖嘴尺蛾

(Fig. 1l)

Zamacra praeacutaria, Inoue, 1976, *Tinea* 10 (2): 21, text–fig. 3, fig. 39.
Apochima praeacutaria: Inoue, 1992: 116; Fu *et al*., 1995: 22, pl. 1: 12; Wang, 1998: 267, figs.; Parsons *et al*., 1999: 56; Sato, 2011: 178, pl. 27: 11, 12.

Specimens examined. TAIWAN: 1♂, Hsinchu, Jianshi, 1,000 m, 1. III. 2019, leg. S. Wu (TFRI); 1♀, Taichung Co., Baxianshan, 1,000 m, 8. III. 1994, leg. C. M Fu (CCMF); 1♀, same collecting locality, 7. III. 1995, leg. C. M Fu (CCMF); 1♂, same collecting locality, 16. III. 1996, leg. C. M Fu (CCMF); 2♂♂, Taichung Co., Songhe, 1,469 m, 22. II. 2020, leg. C. C. Yang (TFRI); 1♂, Ilan Co., Fushan Botanical Garden, 15. III. 2014, leg. Y. B. Fan (TFRI); 1♂, Ilan Co., Mingchi, 28. II. 2016, leg. C. G. Lai (TFRI); 1♀, Haulien Co., Tiangxiang, 480 m, 25. III. 2017, leg. S. F. Lu (TFRI).

Distribution. Japan, Taiwan (Sato, 2011).

Note. The common name, 尖嘴尺蛾, was proposed by Wang (1998). We follow the generic common name in Lu (1991) and propose a new recommended species common name.

Planociampa chlora Yazaki & Wang, 2003

綠朴尺蛾

(Figs 1j, 1k, 2f, 2j)

Planociampa chlora Yazaki & Wang, 2003, *Tinea* 17: 206, figs 12-14; Yazaki & Wang, 2011: 122, pl. 20: 6.

Specimens examined. CHINA: 1♂1♀, Guangdong, Shaoguan, Nanling, 700–1,200 m, 20-24. II. 2003 (NSMT). **TAIWAN:** 1♂, Hsinchu Co., Luoshan, 1,000 m, 24. III. 2018, leg. S. Wu & S. S. Wu (TFRI); 1♂, Kaohsiung Hsien [=Kaohsiung Co.], Terngjy, 1,550 m, 22. III. 1991, leg. H. Y. Wang (NMNS); 2♂, Ilan Co., Fushan Botanical Garden, 20–21. II. 2002, leg. S. S. Lu (TFRI); 3♂, same collecting locality, 12–20. II. 2003, leg. S. S. Lu (TFRI); 1♂1♀, same collecting locality, 31. I. 2010, leg. S. Wu (TFRI); 1♂, Taichung Co., Baxianshan, 1,000 m, 16. III. 1994, leg. C. M. Fu (CCMF); 1♀, same collecting locality, 7. III. 1995, leg. C. M. Fu (CCMF).

Distribution. Southern China (Yazaki & Wang, 2011); Taiwan (new record).

Bionomics. This species is distributed in low to mid-elevation broadleaf forests. The adults occur during January and March.

Note. The specimens from Taiwan and the type locality, “Mts Nanling”, China and Taiwan have been dissected for comparison, but there are no remarkable genitalic differences. The common name follows Yazaki & Wang (2011).

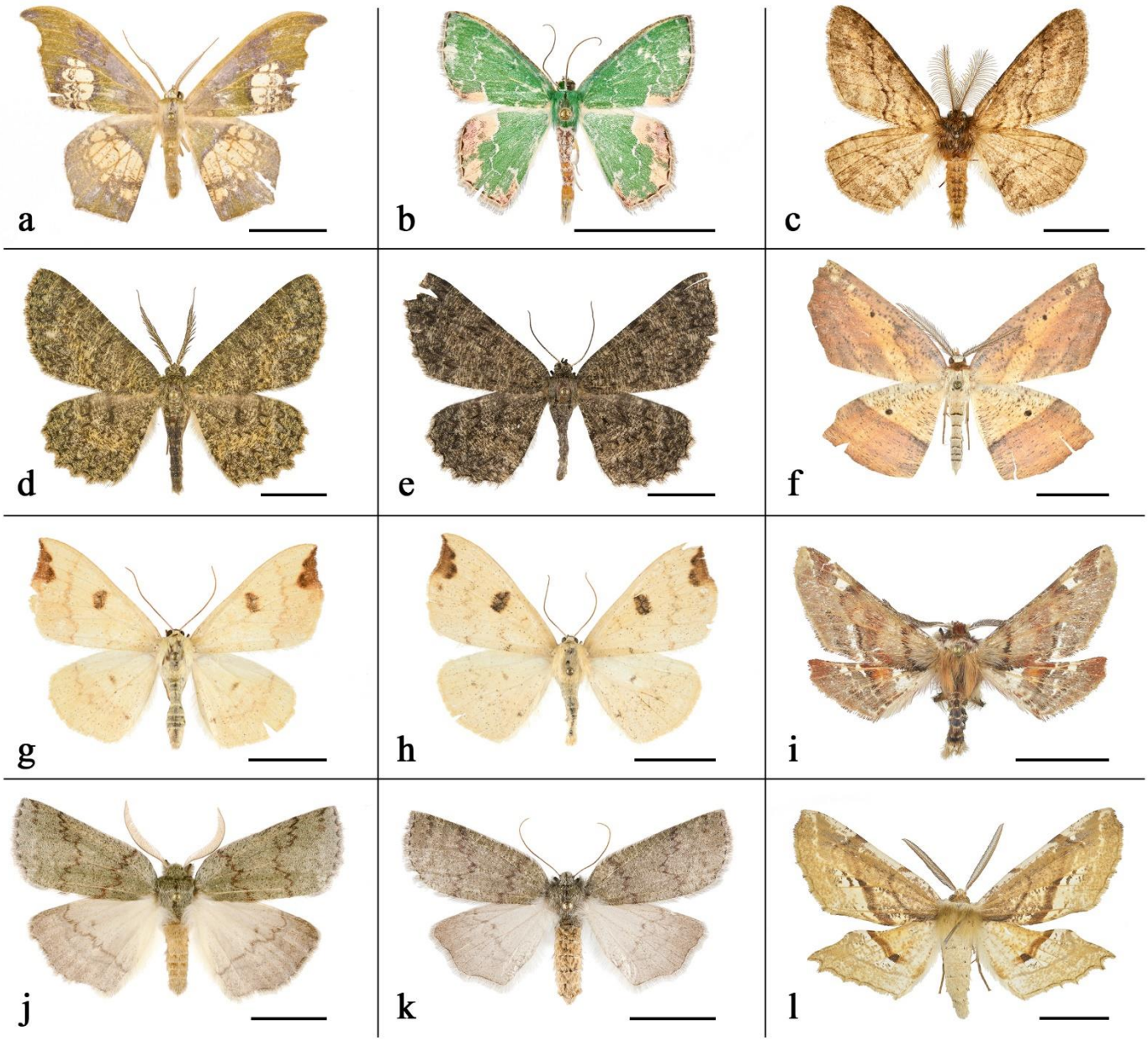

Figure 1. Habitus of geometrid moths of Taiwan. a. *Timandromorpha enervata* Inoue, 1944 ♂; b. *Eucyclodes infracta* (Wileman, 1911) ♂; c. *Megabiston plumosaria* (Leech, 1891) ♂; d. *Hypomecis hyposticta* (Wehrli, 1925) ♂; e. *Ditto* ♀; f. *Xyloscia dentifera* Inoue, 1986; g. *Eilicrinia nuptaria* Bremer, 1864 ♂; h. *Ditto* ♀; i. *Apochima excavata* (Dyar, 1905) ♂; j. *Planociampa chlora* Yazaki & Wang, 2003 ♂; k. *Ditto* ♀; l. *Apochima praeacutaria* (Inoue, 1976) ♂. Scale bar= 10 mm. Courtesy of specimens. TFRI (a, b, d, e–h, j–l), NTM (c), HNHM (i). Photo by Shipher Wu.

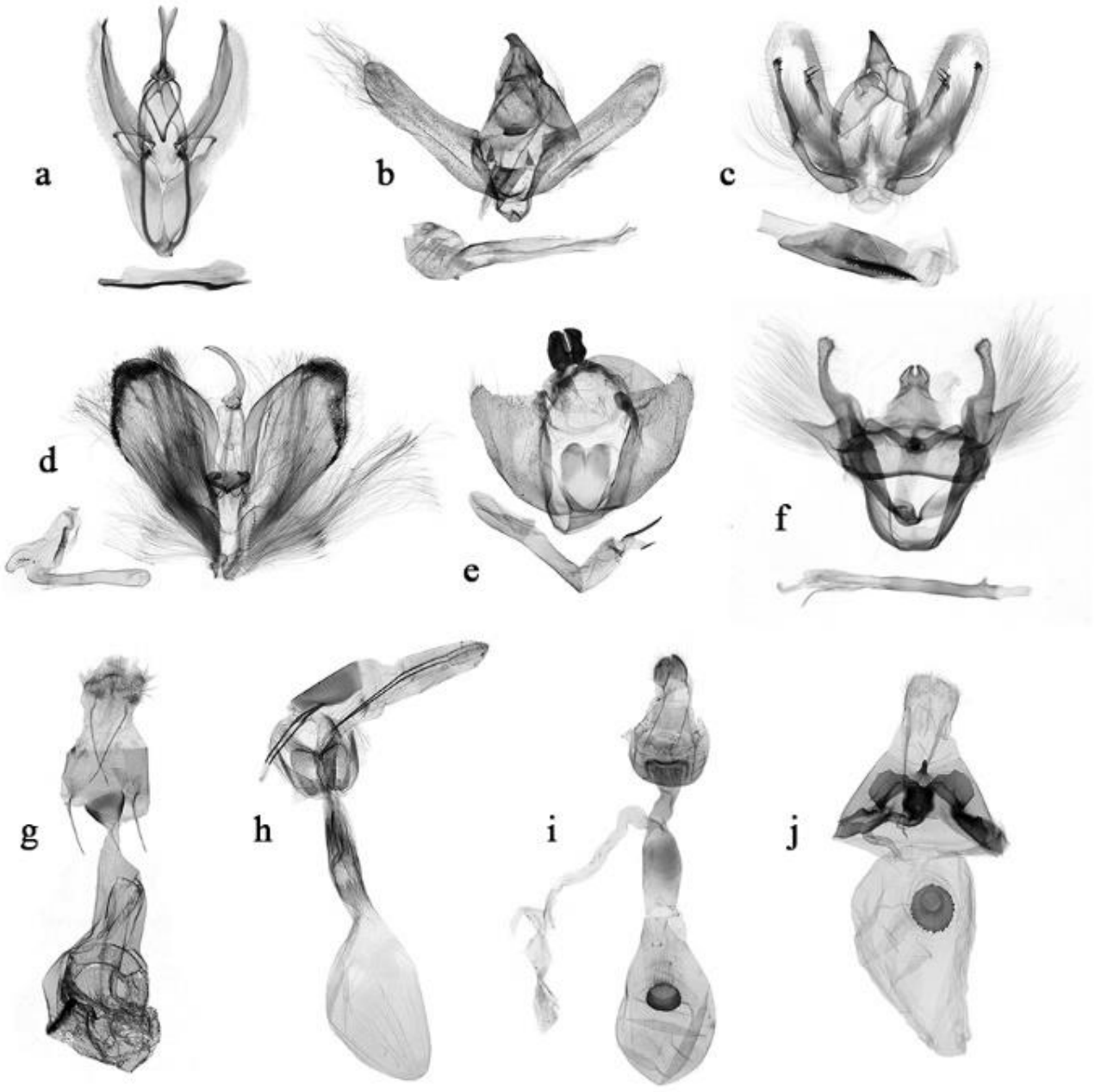

Figure 2. Genitalia of geometrid moths of Taiwan. a. *Eucyclodes infracta* (Wileman, 1911) ♂; g. *Ditto* ♀; b. *Megabiston plumosaria* (Leech, 1891) ♂; c. *Hypomecis hyposticta* (Wehrli, 1925) ♂; h. *Ditto* ♀; d. *Eilicrinia nuptaria* Bremer, 1864 ♂; i. *Ditto*, ♀; e. *Apochima excavata* (Dyar, 1905) ♂; f. *Planociampa chlora* Yazaki & Wang, 2003 ♂; j. *Ditto* ♀. Courtesy of specimens. TFRI (a, c, d, f–j), NTM (b), HNHM (e). Photo by Shipher Wu.

Discussion

The mid-to–high elevation geometrid fauna of Taiwan have been investigated since the beginning of 20th century, e.g. Fu and Tzuoo (2002; 2004) and Fu *et al*. (2013). The species recorded in this study were mainly collected below 2,000 meters. Among them, *E. infracta* is restricted to Northern Taiwan, and *H. hyposticta* is restricted in Southeastern Taiwan. Three newly recorded species, i.e. *M. plumosaria, A. excavata*, and *P. chlora* have only one generation in other distributional regions and are on the wing in colder seasons. In order to better understand the Taiwanese geometrid fauna, further studies are required in those areas which have been poorly-sampled, as well as sampling throughout the year.

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References

Axmacher, J. C. & Fiedler, K. 2008. Habitat type modifies geometry of elevational diversity gradients in geometrid moths (Lepidoptera Geometridae) on Mt Kilimanjaro, Tanzania. *Tropical Zoology* 21 (2): 243–251.

Axmacher, J. C, Holtmann, G., Scheuermann, L., Brehm, G., Müller-Hohenstein, K. & Fiedler, K. 2004. Diversity of geometrid moths along an Afrotropical altitudinal rainforest transect. *Diversity and Distributions* 10: 293–302.

Beljaev, E. A. & Park, K. T. 1998. New and little known Ennominae (Lepidoptera, Geometridae) from Korea and Russian Far East, with descriptions of three new species. *Tinea* 15 (3): 243–255.

Betts, C. R. (eds). 1987. CIE Guides to Insects of Importance to Man. Vol. 1. CAB International, Wallingford. 262 pp.

Brehm, G. & Fiedler, K. 2003. Faunal Composition of Geometrid Moths Changes with Altitude in an Andean Montane Rain Forest. *Journal of Biogeography* 30 (3): 431–440.

Bremer, O. 1864. Lepidpoteran Ostsibiriens, insbesondere des Amur-Landes, gesammelt von den Herrn G. Radde, R, Maack und P. Wulffius. *Mémoires de l'Académie impériale des sciences de St. Pétersbourg* (7) 8: 1–89.

Chang, B. S. 1990a. Illustrations of Moths in Taiwan. Vol. 3. Taiwan Museum, Taipei. 350 pp. (in Chinese)

Chang, B. S. 1990b. Illustrations of Moths in Taiwan. Vol. 4. Taiwan Museum, Taipei. 366 pp. (in Chinese)

Chang, Y. C. & Fan, Y. B. 1989. Studies on moth fauna of Taroko National Park. Taiwan Forestry Research Institute, Taipei. 98 pp.

Chen, I. C., Shiu, H. J., Benedick, S., Holloway, J. D., Chey, V. K., Barlow, H. S., Hill, J. K. & Thomas, C. D. 2009. Elevation increases in moth assemblages over 42 years on a tropical mountain. *Proceedings of the National Academy of Sciences of the United States of America* 106 (5): 1479–1483. doi: 10.1073/pnas.0809320106

Choi, S. W. 2006. Patterns of Species Description and Species Richness of Geometrid Moths (Lepidoptera: Geometridae) on the Korean Peninsula. *Zoological Science* 23: 155–160.

Chu, H. F. 1981. Geometridae. pp 112–131, pls 29–37. In: Chu, H. F. (eds). Iconographia heterocerorum Sinicorum 1. Science Press, Beijing.

Dyar, H. G. 1905. A descriptive list of a collection of early stages of Japanese Lepidoptera. *Proceedings of the United States National Museum (Washington)* 28: 937–956.

Fang, Y. C. 2003. Geometridae. pp 189–348. In: Fang, Y. C. (eds). Butterflies and moths of Lushan. Jianxi University Press, Nanchang.

Fu, C. M. & Tzuoo, H. R. 2002. Moths of Anmashan, Part 1. Taichung Nature Research Society, Taichung. 127 pp + pls 1–36.

Fu, C. M. & Tzuoo, H. R. 2004. Moths of Anmashan, Part 2. Taichung Nature Research Society, Taichung. 215 pp + pls 37–60.

Fu, C. M., Ronkay, L. & Lin, H. H. (eds). 2013. Moths of Hehuanshan. Endemic Species Research Institute, Nantou. 557 pp + 45 pls.

Fu, C. M., Tzuoo, H. R. & Chen, W. H. 1995. Survey of the moths at Pahsienshan area. Ping-Lin Elementary School, Taichung. 88 pp.

Han, H. X. & Xue, D. Y. 2011. Fauna Sinica. Insecta Vol. 54, Lepidoptera, Geometridae: Geometrinae. Science Press, Beijing. i–xviii + 787 pp + 20 pls. (in Chinese)

Heidrich, L., Friess, N., Fiedler, K., Brändle, M., Hausmann, A., Brandl. R. & Zeuss, D. 2018. The dark side of Lepidoptera: Colour lightness of geometrid moths decreases with increasing latitude. *Global Ecology and Biogeography* 27: 407–416.

Holloway, J. D. 1996. The Moths of Borneo: Family Geometridae, subfamilies Oenochrominae. Desmobathrinae and Geometrinae. part 9. *Malayan Nature Journal* 49: 147–326.

Inoue, H. 1941. On some Geometridae of Corea. *Mushi* 14 (1): 11–28.

Inoue, H. 1944. Notes on some Japanese Geometridae. *Transactions of the Kansai Entomological Society* 14 (1): 60–71.

Inoue, H. 1946. A catalogue of the Geometridae of Corea. *Bulletin of the Lepidoptera Society of Japan* 1 (2): 19–59.

Inoue, H. 1961. Lepidoptera: Geometridae. *Insecta Japonica* (1) 4, Hokuryukan, Tokyo. 106 pp + 7 pls.

Inoue, H. 1976. Descriptions and records of some Japanese Geometridae (V). *Tinea* 10 (2): 7–37.

Inoue, H. 1977. Catalogue of the Geometridae of Japan (Lepidoptera). *Bulletin of Faculty of Domestic Sciences of Otsuma Women's University* 13: 1–346.

Inoue, H. 1982. Geometridae. pp 425–573. In: Inoue, H., Sugi, S., Kuroko, H., Moriuti, S. & Kawabe, A. (eds). Moths of Japan 1. Kodansha, Tokyo.

Inoue, H. 1986. Further new and unrecorded species of the Geometridae from Taiwan with some synonymic notes (Lepidoptera). *Bulletin of Faculty of Domestic Sciences of Otsuma Women's University* 22: 211–267.

Inoue, H. 1992. Geometridae. pp 111–129. In: Heppner, J. B., Inoue, H. (eds). Lepidoptera of Taiwan, Vol. 1, Part 2: Checklist. Association for Tropical Lepidoptera, Gainesville.

Kim, S. S., Beljaev, E. A. & Oh, S. H. 2001. Illustrated Catalogue of Geometridae in Korea (Lepidoptera: Geometridae, Ennominae). pp 1–279. In: Park, K. T. (eds). Insects of Korea Series 8. Korea Research Institute of Bioscience & Biotechnology; Chuncheon: Center for Insect Systematics, Deajon.

Kim, S. S., Beljaev, E. A. & Oh, S. H. 2001. Illustrated catalogue of Geometridae in Korea. pp 279. In: Park, K. T. (eds). Insects of Korea [series 8]. Korean Research Institute of Bioscience and biotechnology & Center for Insect Systematics, Seoul.

Kim, S. S., Choi, S. W., Sohn, J. C., Kim, T. & Lee, B. W. 2016. The Geometrid moths of Korea (Lepidoptera: Geometridae). National Institute of Biological Resources, Seoul. 498 pp.

Kim, S. S. & Shin, Y. H. 1996. Notes on eleven unrecorded and nineteen little known geometrid moths from Korea. *Journal of the Lepidopterists Society of Korea* 9: 15–25.

Leech, J. H. 1891. Descriptions of new species of Geometridae from China, Japan and Corea. *Entomologist (London)* 24 (Suppl.): 42–56.

Lu, C. S. (eds). 1991. Butterflies and moths of mount Tai. Shandong Science Press, Tainan. 152 pp.

Nakajima, H. 2011. Geometridae (Geometrinae). pp 205–224 + pls 40-45. In: Kishida, Y. (eds). The Standard of Moths in Japan 1. Gakken Education Publising, Tokyo. (In Japanese)

National Science Data Infrastructure of Forestry. 2020. Available from http://hnsdc.org. Accessed 18 March, 2020.

Paknia, O. & Rajael, H. 2015. Geographical patterns of species richness and beta diversity of Larentiinae moths (Lepidoptera: Geometridae) in two temperate biodiversity hotspots. Journal of Insect Conservation 19 (4): 729–739. doi: 10.1007/s10841-015-9795-0

Parsons, M. S., Scoble, M. J., Honey, M. R., Pitkin, L. M. & Pitkin, B. R. 1999. The catalogue. pp 1–1016 + index pp 1–129. In: Scoble, M.J. (eds). Geometrid Moths of the World. A Catalogue (Lepidoptera, Geometridae). CSIRO, Collingwood.

Prout, L. B. 1912. Lepidoptera Heterocera, fam. Geometridae, subfamily Hemitheinae. pp 1–274 + pls 1–5. In: Wytsman P. Genera Insectorum 129. Bruxelles [Publisher unknown].

Sato, R. 2011. Geometridae (Ennominae). pp 132–200 + pls 8–38. In: Kishida Y. (eds). The Standard of Moths in Japan 1. Gakken Education Publishing, Tokyo. (In Japanese)

Sato, R. & Fan, X. L. 2011. Geometridae (1). pp 53–71 + pls 5–9. In: Wang M., Kishida Y. (eds). Moths of Guangdong Nanling National Nature Reserve. Goecke & Evers, Keltern.

Sato, R. & Kawakami, Y. 2001. A new species of *Megabiston* Warren (Geometridae: Ennominae) from Japan. *Japan Heterocerists' Journal*. 214: 259–263.

Scoble, M. J., Gaston, K. J. & Crook, A. 1995. Using taxonomic data to estimate species richness in Geometridae. *Journal of Lepidopterists' Society* 49 (2): 136–147

Shin, Y. H. 1983. Gepmetridae. pp 168–272, 760–821, 994–1002 + pls 1–14. In: Shin Y. H., Park, Park, K. T., Nam, S. H. (eds). Illustrated Flora and Fauna of Korea. 27 (Insecta). Samhwa Chulpansa, Seoul.

TaiCOL–Catalogue of Life in Taiwan. Available from http://taibnet.sinica.edu.tw/home.php?. Accessed 19 March, 2020.

Välimäki, P., Kivelä, S. M., Mäenpää, M. & Tammaru, T. 2013. Latitudinal clines in alternative life histories in a geometrid moth. *Journal of Evolutionary Biology* 26 (1): 118–129.

Vojnits, A. M., Park, K. T. & Shin, Y. H. 1994. New faunistic data on the family Geometridae (Lepidoptera) of the Korean Peninsula. *Korean Journal of Applied Entomology* 33 (1): 16–18.

Wang, H. Y. 1998. Geometer Moths of Taiwan and It's allied Species from the neighboring countries Vol. 2. Taiwan Museum, Taipei. 399 pp. (in Chinese).

Wehrli, E. 1925. Neue und wenig bekannte paläarktische und südchinesische Geometriden-Arten und Forrnen (Sammlung Höne), 3. *Mitteilungen der Münchner Entomologischen Gesellschaft* 15: 48–60.

Wehrli, E. 1927. [Unavailable]. pp 96. In: Bang–Haas, O. (eds). Horae macrolepidopt Reg palaeact 1. [Publishing information unavailable]

Wileman, A. E. 1911. New and unrecorded species of Lepidoptera Heterocera from Japan. *Transactions of the Entomological Society of London* 1911: 189–407.

Wu, C. H., Holloway, J. D., Hill, J. K., Thomas, C. D., Chen, I. C. & Ho, C. K. 2019. Reduced body sizes in climate-impacted Borneo moth assemblages are primarily explained by range shifts. *Nature Communications* 10 (1): 4612. doi: 10.1038/s41467-019-12655-y

Xing, S., Bonebrake, T. C., Ashton, L. A., Kitching, R. L., Cao, M., Sun, Z., Ho, J. C. & Nakamura, A. 2018. Colors of night: Climate–morphology relationships of geometrid moths along spatial gradients in southwestern China. *Oecologia* 188: 537–546.

Yazaki, K. & Wang, M. 2003. Notes on geometrid moths (Lepidoptera, Geometridae) from Nanling Mts, S. China (I). *Tinea* 17 (4): 200–211.

Yazaki, K. & Wang, M. 2011. Geometridae (2). pp 72–124 + pls 11–20. In: Wang, M. & Kishida, Y. (eds). Moths of Guangdong Nanling National Nature Reserve. Goecke & Evers, Keltern.

臺灣產少見種與新紀錄種尺蛾註記（鱗翅目：尺蛾科），第一部

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摘要: 本研究為釐清臺灣產少見與新紀錄種尺蛾科物種的系列文章第一部分。包含九個物種，其中六種為新紀錄種，即彎彩翠尺蛾 *Eucyclodes infracta* (Wileman, 1911) 、羽霾尺蛾 *Megabiston plumosaria* (Leech, 1891) 、墨褐尺蛾 *Hypomecis hyposticta* (Wehrli, 1925)、尖耳蟠尺蛾 *Eilicrinia nuptaria* Bremer, 1864、桑摺翅尺蛾 *Apochima excavata* (Dyar, 1905) 、綠朴尺蛾 *Planociampa chlora* Yazaki & Wang, 2003。四物種，即墨褐尺蛾、銳齒木尺蛾 *Xyloscia dentifera* Inoue, 1986、尖耳蟠尺蛾與尖嘴摺翅尺蛾 *A. praeacutaria* (Inoue, 1976) 提供新稱建議中文名與註記。

關鍵詞: 生物相、物種豐度、大陸型島嶼、東方區、印澳區

[研究文章 Research Article]

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Notes on *Lycocerus* Gorham and *Stenothemus* Bourgeois of Taiwan (Coleoptera: Cantharidae)

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Abstract. Supplementary descriptions and information on the morphology of *Lycocerus yitingi* Hsiao & Okushima, 2016, *Stenothemus gemini* Hsiao, Okushima & Yang, 2016 and *S. mamorui* Okushima & M. Satô, 1999 are provided.

Key words: Soldier beetles, Cantharinae, variation, Asia

Introduction

Cantharidae are a diverse group of soft-bodied and often brightly colored beetles. Presently, 181 species and subspecies of Cantharidae have been documented in Taiwan (Satô *et al*. 2014; Taiwan Catalogue of Life, 2020). In this article, additional morphological information of *Lycocerus yitingi* Hsiao & Okushima, 2016, *Stenothemus gemini* Hsiao, Okushima & Yang, 2016 and *S. mamorui* Okushima & M. Satô, 1999 is given.

Materials and methods

Materials examined in this paper were deposited in the following collections: TARI (Taiwan Agricultural Research Institute, Wufeng, Taichung, Taiwan); TFRI (Taiwan Forestry Research Institute, Zhongzheng, Taipei, Taiwan); YHC (Y. Hsiao's private collection, Taichung, Taiwan). The terminology used in the morphological descriptions and methods used for specimen and figure preparation follows that of Hsiao (2015) and Hsiao *et al*. (2016a).

Results

Subfamily Cantharinae 菊虎亞科

Tribe Cantharini 菊虎族

奕霆紋繪異菊虎 *Lycocerus yitingi* Hsiao & Okushima, 2016 (Figs. 1–2)
Lycocerus yitingi Hsiao & Okushima in Hsiao et al. 2016: 11.

Material examined. TAIWAN: 2♂♂1♀, Antung, Hualien, 14–17.II.1984, K.-C. Chou & C.-C. Pan leg. (TARI); 1♂, Tahanshan, Pingtung, 17.III.2014., Y.-T. Chung leg. (TARI); 1♂1♀, Tahanshan, Pingtung, 28.II.2018, Y. Hsiao leg. (YHC).

Remarks. Hsiao *et al*. (2016a) examined several specimens, including a single male, whose coloration differed slightly from that of *L. yitingi* type material they had seen; these are listed under 'Other material' in Hsiao *et al*. (2016a, p. 11). These specimens, some of which were also collected from around Hualien and Pingtung, were described as being almost completely orange-yellow, and having only indistinct black areas across the vertex, pronotum, legs, elytral sutures and lateral margins. However, in the absence of additional male specimens, the authors were unsure if these specimens represented a distinct taxon, or were simply color variants of *L. yitingi*. I herein have examined additional male specimens from these localities, and I have confirmed that these specimens are indeed color variants of *L. yitingi*. Furthermore, Hsiao *et al*. (2016a) stated that *L. yitingi* can be separated from its closest congener, *L. pictus* (Wittmer, 1983), by the apically truncated laterophyse (Fig. 1). Nevertheless, one specimen from the type locality was

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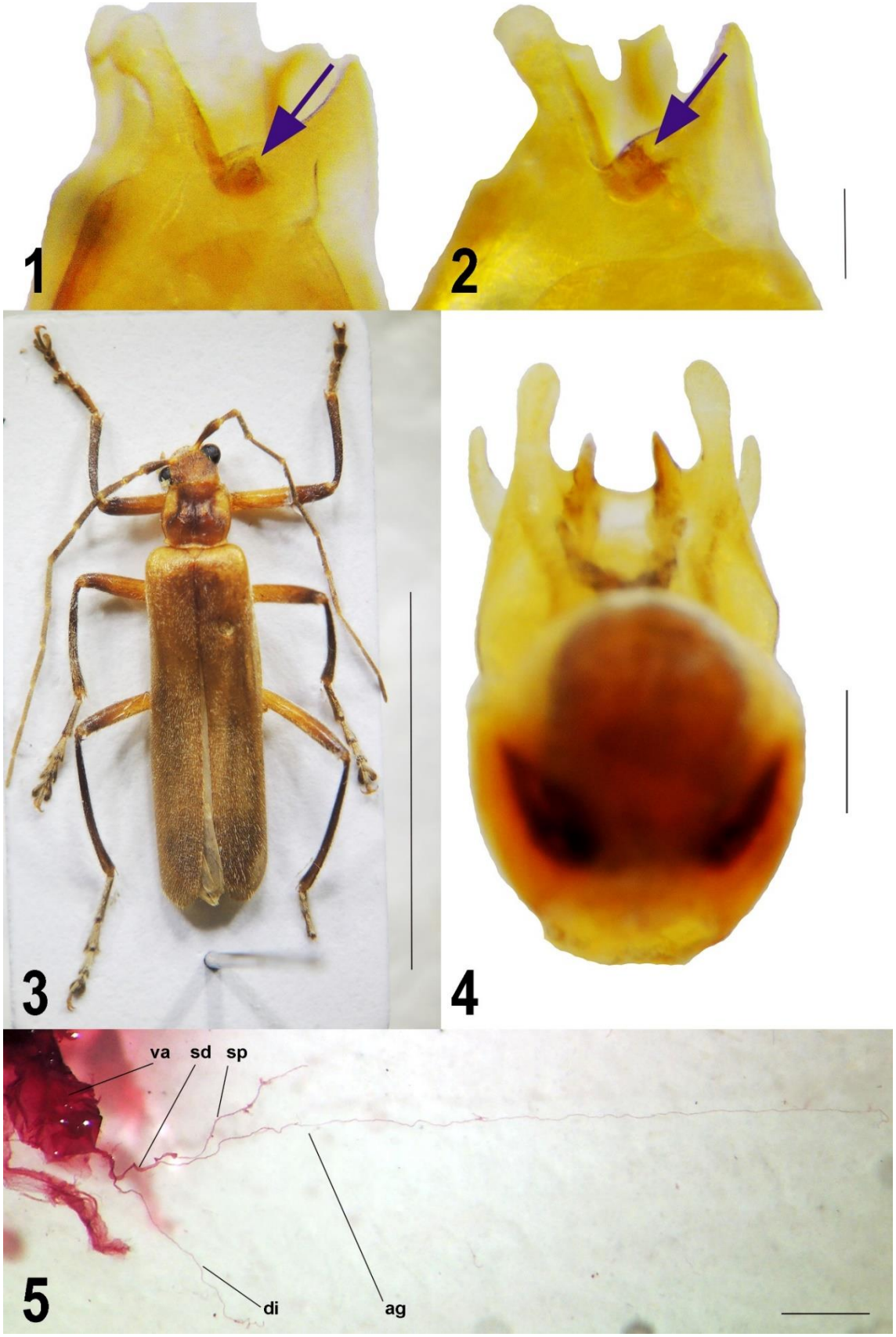
found to have an apically pointed laterophyse (Fig. 2), which implies that this character cannot be the sole criterion for differentiating these two species.



Figures 1–5. 1–2 - Laterophyses of the aedeagus of *Lycocerus yitingi* Hsiao & Okushima, 2016; 3 - Habitus of *Stenothemus gemini* Hsiao, Okushima & Yang, 2016, dorsal view; 4 - Male genitalia of *S. gemini* Hsiao, Okushima & Yang, 2016, aedeagus in dorsal

view; 5 - Female genitalia of *S. mamorui* Okushima & M. Satô, 1999, scale bars: 1–2 - 0.1 mm; 3 - 5 mm; 4 - 0.5 mm; 5 - 1.0 mm. The abbreviations are as follows: ag—accessory gland; di—diverticulum; sd—spermathecal duct; sp—spermatheca; va—vagina.

雙子狹胸菊虎 *Stenothemus gemini* Hsiao, Okushima & Yang, 2016 (Figs. 3–4)
Stenothemus gemini Hsiao, Okushima & Yang, 2016: 111.

Material examined. TAIWAN: 1♂, Guanwu, Hsinchu, 15.XI.1990, Y.-B. Fan leg. (TFRI);

Remarks. Hsiao *et al*. (2016b) mentioned that this species differs from its closest congeners by its aedeagal dorsal plate, which has thin processes along its inner sides, parallel to each other. However, one specimen from the same county as that of the type locality reveals that these processes can also take a more oblique form, such that their apices converge slightly (Fig. 4). Additionally, this specimen exhibits lighter coloration across the usually dark areas of head and pronotum, representing another color variant within this species (Fig. 3).

棕背狹胸菊虎 *Stenothemus mamorui* Okushima & M. Satô, 1999 (Fig. 5)
Stenothemus mamorui Okushima & M. Satô, 1999: 137.

Remarks. One erratum was present in the female description and illustration of Hsiao *et al*. (2016b). The spermatheca was mislabeled as the accessory gland in figure 38, and thus the proposed diagnostic difference of this character compared with *S. lupus* Hsiao, Okushima & Yang (2016) should be removed. The description of female genitalia is herein corrected and illustrated as follows: spermatheca with a thin and spiral tube, about as long as diverticulum; accessory gland thin, spiralling and very long (Fig. 5).

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I wish to express my gratitude to Prof. Yu-Xia Yang (Hebei University) for the discussion, and to Dr. Chi-Feng Lee (TARI) and Dr. Sheng-Shan Lu (TFRI) for loaning specimens. I am also indebted to the editors and anonymous reviewers for improving the manuscript.

References

Hsiao, Y. 2015. Description of two new species of the genus *Stenothemus* from Taiwan (Coleoptera: Cantharidae). *Zootaxa* 3937 (2): 386–392.
Hsiao, Y., Okushima, Y., Yang, P.-S. & Ko, C.-C. 2016a. Taxonomic revision of the *Lycocerus hanatanii* species group (Coleoptera, Cantharidae), with the description of new species from Taiwan. *European Journal of Taxonomy* 170: 1–33.
Hsiao, Y., Okushima, Y., & Yang, P.-S. 2016b. Review of the genus *Stenothemus* Bourgeois from Taiwan, with description of three new species (Coleoptera: Cantharidae) and additional distributional records of previously known species. *Zootaxa* 4117 (1): 101–114.
Okushima, Y. & Satô, M. 1999. Cantharid beetles of the genus *Stenothemus* (Coleoptera, Cantharidae) from Taiwan. *Elytra, Tokyo* 27: 131–140.
Satô, M., Okushima, Y., Takahashi, N., Li, C.-L., Yang, Y.-X. & Hsiao, Y. 2014. Checklist of the Cantharidae of Taiwan (Coleoptera: Elateroidea). *Collection and Research* 27: 43–69.
Taiwan Catalogue of Life, 2020. Available from: http://taibnet.sinica.edu.tw/ (accessed 5 April 2020).

臺灣產異菊虎屬和狹胸菊虎短記（鞘翅目：菊虎科）

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摘要: 本篇文章提供奕霆紋繪異菊虎 *Lycocerus yitingi* Hsiao & Okushima, 2016、雙子狹胸菊虎 *Stenothemus gemini* Hsiao, Okushima & Yang, 2016 和棕背狹胸菊虎 *Stenothemus mamorui* Okushima & M. Satô, 1999 之形態學補述和資訊。

關鍵詞: 菊虎、菊虎亞科、變異、亞洲

[研究文章 Research Article]

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Review of the Genus *Platynectes* Straneo, 1939 (Coleoptera: Dytiscidae) from Taiwan

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Abstract. The diving beetle genus *Platynectes* Straneo, 1939 of Taiwan is reviewed based on freshly collected materials and museum collections. The altitudes of habitats are different between two *Platynectes* species. *P. babai* Satô, 1982 appears to have a preference for higher elevations (from 750 to 2,000 meters), while *P. gemellatus* Šťastný, 2003 appears to prefer lower elevations (from 50 to 1,200 meters). In addition, *P. babai* was observed aestivating in wet mud during the dry season. A key to the Taiwanese species of *Platynectes* is provided.

Key words: Dytiscidae, diving beetle, aquatic insect, biology, Taiwan

Introduction

Platynectes Straneo, 1939 is a genus of aquatic beetles inhabiting forest ponds, streams, and water films on rock surfaces, and is widely distributed in Palearctic, Oriental, Neotropical regions, as well as in Australia (Hájek et al., 2019; Šťastný, 2003). Two species have so far been recorded in Taiwan (Nilsson, 1995; Šťastný, 2003; Liu, 2019; Nilsson & Hájek, 2020a, 2020b). I conducted a survey in Taiwan from 2018–2020, and have recorded locality information, including altitudes as well as some notes on the biology of these species.

Materials and methods

Male genitalia were dissected from water-relaxed specimens and examined in temporary glycerine slides without cover glasses. In case the aedeagus was already dissected by previous authors and dry-mounted, it was relaxed in a drop of water, then transferred to 10% KOH which was heated on a hot plate at 80℃ until the solution appeared to be superficially degassed. The genitalia were then transferred directly to glycerine for examination. After examination, the aedeagus was rinsed in 95% alcohol before being mounted in Euparal on a small slide below the respective specimen. In some duplicate specimens, the aedeagus was mounted on the same card as the specimen using a water-soluble glue. Male genitalia and morphological characters were examined using a Leica DM750 compound microscope. The map (Fig. 2) was produced in Photoshop CS6.

The materials examined in this paper are deposited at department of Entomology, National Taiwan University, Taipei City, Taiwan (NTU: Chiun-Cheng Ko, Jhih-Rong Liao); National Museum of Natural Science, Taichung City, Taiwan (NMNS: Jing-Fu Tsai); Department of Entomology, National Chung Hsing University, Taichung City, Taiwan (NCHU: Man-Miao Yang, Bao-Cheng Lai, Sheng-Feng Lin) and the author's collection (HCC: Hsing-Che Liu's private collection, Hsinchu County, Taiwan).

Results

Platynectes babai Satô, 1982

Chinese name: 馬場氏扁形豆龍蝨

(Figs. 1A–C)

Platynectes babai Satô, 1982: 3.

Material examined. TAIWAN: 1 ex. Tachien [= in Taichung City], 2. IX. 1993, Ching-Hsin Hsu leg. (NTU); 1 ex. Taichung, Hoping Wushikeng, 15-16. III. 1995, W. T. Yang leg, by UV light (NMNS); 2 ex. Nantou county, Jenai Chunyung, 10-12. VIII. 1998, C. S. Lin & W. T. Yang leg, by UV light (NMNS); 2 males, 2 females. Taichung City, near Lishan (梨山附近), 11. V. 2018, Hsing-Che Liu leg. (HCC); 3 ex. Nantou County, Heshe (和社), 16. V. 2018, Hsing-Che Liu leg. (HCC); 7 ex. Nantou County, Dongpu (東埔), 16. V. 2018, Hsing-Che Liu leg. (HCC); 2 ex. Taichung City, near Dasyueshan (大雪山附近), 10. X. 2018, Hsing-

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Che Liu leg. (HCC); 2 ex. Chiayi County, Alishan Township (阿里山鄉), 30. IV. 2019, Hsing-Che Liu leg. (HCC); 4 ex. Chiayi County, Meishan Township (梅山鄉), 29. IV. 2019, Hsing-Che Liu leg. (HCC); 1 ex. Taoyuan City, Fuxing Township, 2019, unknown leg. (HCC); 5 ex. Nantou County, Renai Township, Nanfeng Village (南豐村), 25. II. 2020, Hsing-Che Liu, Martin Fikáček & Uitsiann Ong leg (HCC).

Diagnosis. Body length 5.4–6.0 mm, body width 3.3–4.0 mm. Head black, interocular region with brown to yellowish spots. Pronotum black, anterior angles brown to yellowish. Elytral margin with faint yellowish longitudinal stripes in posterior half, apex of elytron with spot (Fig. 1A). Male ventrite VI with punctures, lateral striate area with four or five long deep rugae, middle area with seven or eight short deep rugae, while female ventrite VI without deep rugae.
Differential diagnosis. *P. babai* Satô, 1982 is similar to *P. davidorum* Hájek, Alarie, Šťastný & Vondráček, 2019 and *P. hainanensis* Nilsson, 1998; it can be easily differentiated by its body length (5.4–6.0 mm) , and by the narrow median lobe of the male genitalia (Fig. 1C) (Hájek et al., 2019; Šťastný, 2003).
Distribution. This species is only known from Taiwan (Fig. 2B) (Nilsson & Hájek, 2020a).
Bionomics. This species inhabits stagnant (usually shallow) water pools in the forests at altitude between 750 and 2,000 meters (Fig. 2A). Some of the examined specimens were collected at light traps. In the dry season, *P. babai* can utilize wet mud to aestivate (Figs. 1I–J).

***Platynectes gemellatus* Šťastný, 2003**

Chinese name: 條紋扁形豆龍蝨

(Figs. 1D–F)

Platynectes gemellatus Šťastný, 2003: 235.

Material examined. TAIWAN: 1 ex. Nantou County, Lianhuachi (蓮華池), 14. X. 1993, T. C. Hsu leg. (NTU); 3 ex. Nantou County, Lianhuachi (蓮華池), 14. XI. 1993, Shu-Ling Wei leg. (NTU); 1 ex. Huisun Forest Area [= in Nantou County, 惠蓀林場], 18-22. I. 1999 (NCHU); 3 males, 1 female. Hsinchu County, Emei Township, Shishan (獅山), 27. III. 2018, Hsing-Che Liu leg. (HCC); 5 ex. Yilan County, Fushan Botanical Garden (福山植物園), 8. V. 2018, Hsing-Che Liu leg. (HCC); 4 ex. Nantou County, Lianhuachi (蓮華池), 30. XI. 2018, Hsing-Che Liu leg. (HCC); 2 ex. Nantou County, Puli Township (埔里), 15. II. 2020, Hsing-Che Liu leg. (HCC); 3 ex. New Taipei City, Wanggu Waterfall (望古瀑布), 30. III. 2020, Hsing-Che Liu leg. (HCC).

Diagnosis. Body length 4.8–5.6 mm, body width 3.1–3.6 mm. Head with yellowish spots. Pronotum black, anterior angles yellowish. Each elytron with eight yellowish longitudinal vittae and one yellowish interrupted transverse vitta (Fig. 1D); Male ventrite VI with punctures; lateral striate area with four or five long and deep rugae; middle area without deep rugae.
Differential diagnosis. This species is very similar to *P. dissimilis* (Sharp, 1873); *P. dissimilis* can be distinguished from both species by having its genitalic median lobe apically pointed and finely beaded (Šťastný, 2003).
Distribution. China (Guizhou, Guangxi, Guangdong, Hong Kong, Macao, Fujian, Jiangxi), Taiwan (Fig. 2B) (Nilsson & Hájek, 2020a).
Bionomics. All examined specimens were collected from ponds or streams (Figs. 1G–H) at altitude between 50 and 1,200 meters in Taiwan (Fig. 2A).
Remark. This species was previously confused with *Platynectes dissimilis*. A review of *Platynectes* from Southeast Asia by Šťastný (2003) only records the distribution of *P. gemellatus* and *P. babai* in Taiwan.

Key to Taiwanese species of the genus *Platynectes* Leach, 1815

1. Elytra without yellowish transverse vittae (Fig. 1A); male genitalia: apex of median lobe strongly narrowed (Fig. 1C); distribution: altitude from 750 to 2,000 meters (Fig. 2A)……..……..…….……***Platynectes babai* Satô, 1982**
   Elytra with yellowish transverse vittae (Fig. 1D); male genitalia: apex of median lobe weakly narrowed (Fig. 1F); distribution: altitudes from 50 to 1,200 meters (Fig. 2A)…….……...…..…...……***Platynectes gemellatus* Šťastný, 2003**

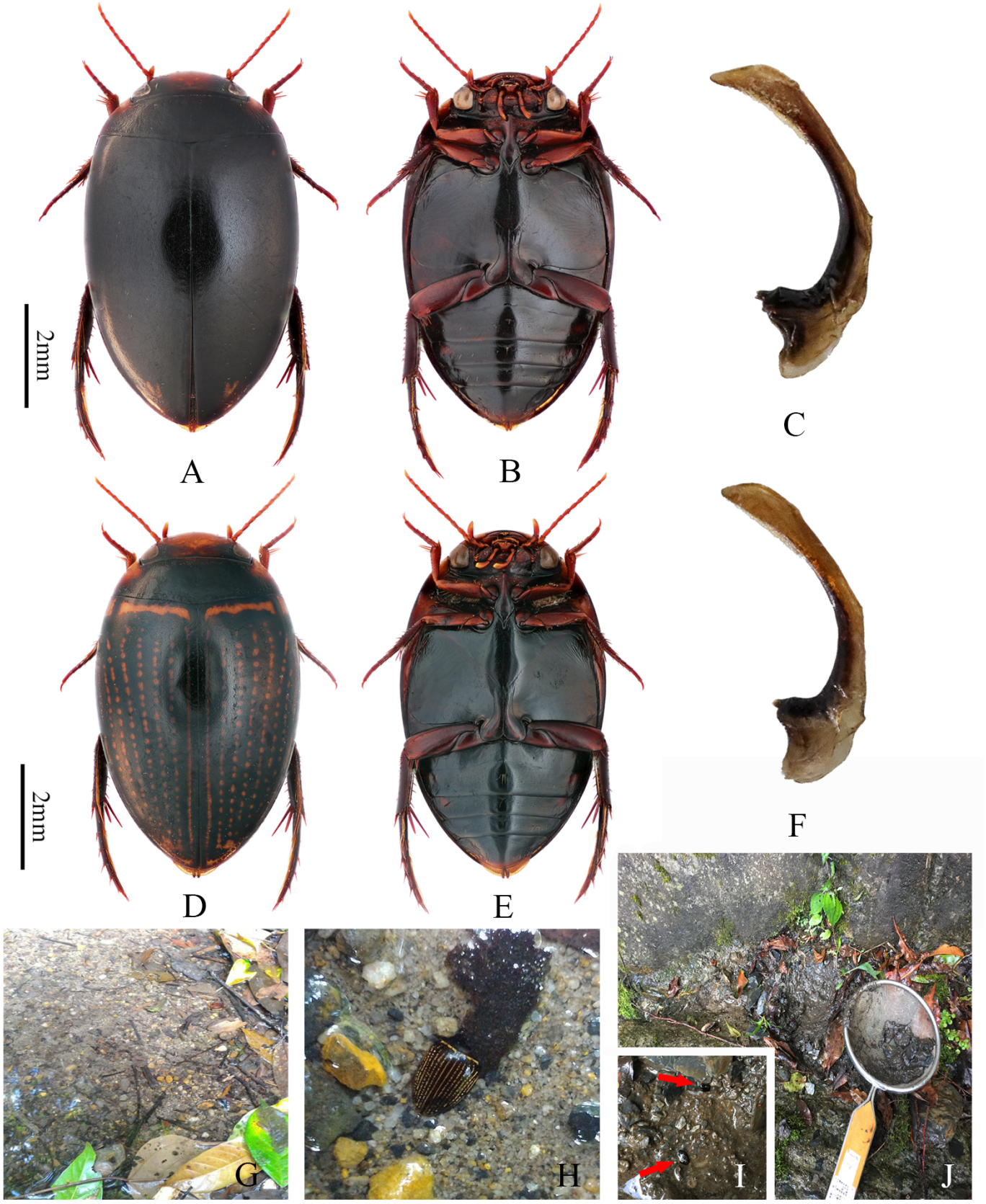

Figure 1. *Platynectes* spp. A–C, I–J - *P. babai*; D–H - *P. gemellatus* (A, D – dorsal habitus; B, E - ventral habitus; C, F - median lobe of male genitalia, lateral view; G–J - habitat, from Nantou county). Photo by Uitsiann Ong (A–B, D–E).

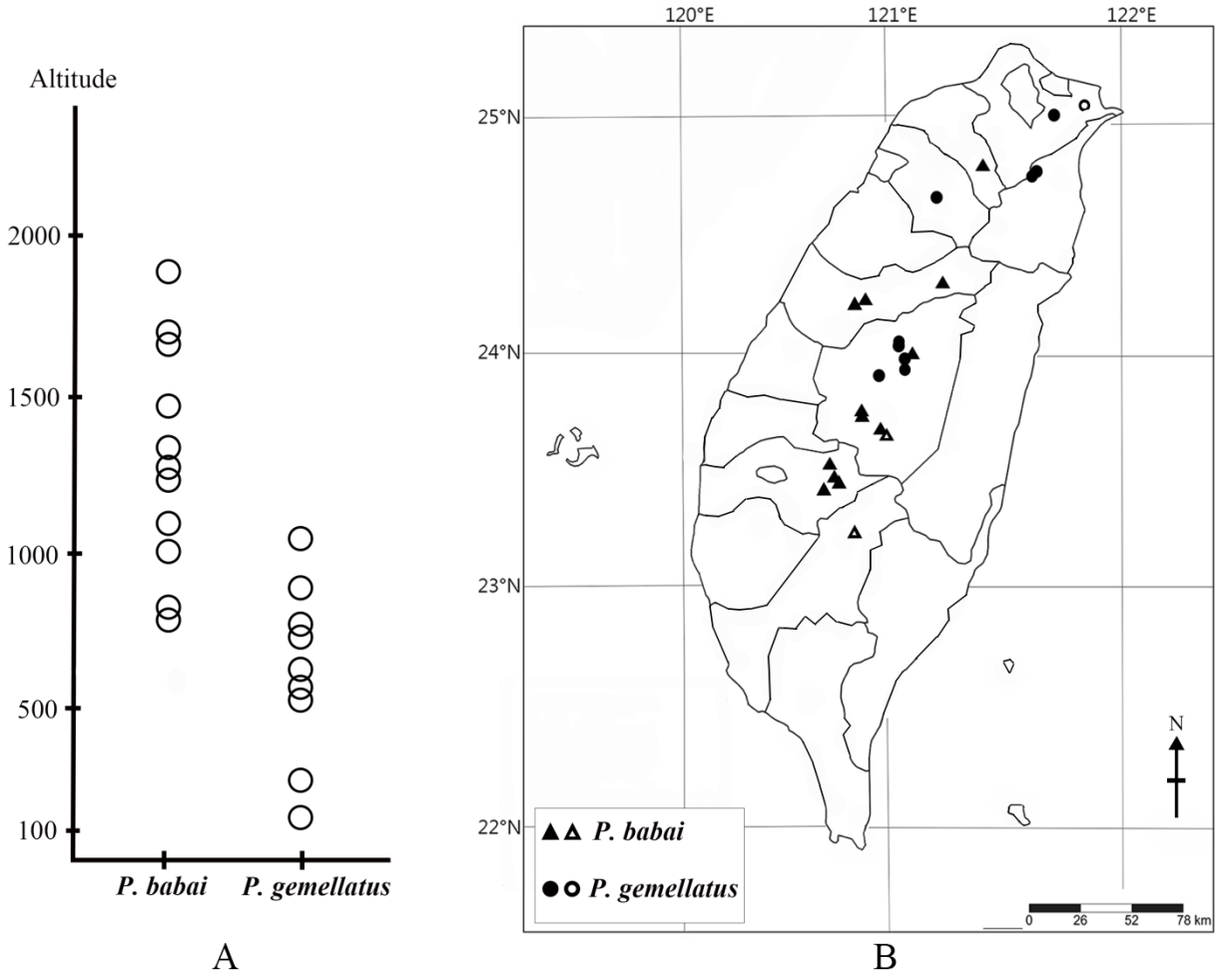

Figure 2. Distribution of *Platynectes* spp. in Taiwan. A - Altitude, unit: meter; B - Map (● and ▲: Material examined; ○ and △: Literature records).

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References

Hájek, J., Alarie Y., Šťastný J. & Vondráček D. 2019. The first hygropetric *Platynectes* and its larva from eastern China (Coleoptera: Dytiscidae). *Acta Entomologica Musei Nationalis Pragae* 59 (1): 217–228.

Liu, H.-C. 2019. Checklist of Determined Insect Specimens in the NCHU Museum of Entomology. I. Dytiscidae (Insecta: Coleoptera). *Taiwanese Journal of Entomological Studies* 4 (3): 19–23.

Nilsson, A. N. 1995. Notcriclac and Dytiscidac: Annotated check list of the Notcridac and Dytiscidae of China (Coleoptera). pp 35–96. In: Jäch, M. A. & Ji, L. (eds). Water Beetles of China, Vol. I., Zoologisch-Botanische Gesellschaft in Ö sterreich and Wiener Colcopterologenverein, Wien.

Nilsson, A. N. & Hájek J. 2020a. Catalogue of Palearctic Dytiscidae (Coleoptera). Internet version 2020-01-01, 89. Available from: http://www.waterbeetles.eu/documents/PAL_CAT_Dytiscidae_2020.pdf (accessed 9 April 2020)

Nilsson, A. N. & Hájek, J. 2020b. A world catalogue of the family Dytiscidae, or the diving beetles (Coleoptera, Adephaga). Version 1.I.2020. Available from: http://www.waterbeetles.eu/documents/W_CAT_Dytiscidae_2020.pdf (accessed 9 April 2020)

Satô, M. 1982. Two new *Platynectes* species from Ryukyus and Formosa (Coleoptera, Dytiscidae). pp 1–4. In: Satô, M., Hori, Y., Arita, Y., Okadome (eds). Special Issue to the memory of retirement of emeritus Professor Michio Chüjö, Nagoya Women's University, Tokyo.

Šťastný, J. 2003. Review of *Platynectes* subgen. *Gueorguievtes* Vazirani from Southeast Asia. pp 217–259. In: Jäch M. A. & Ji L. (eds). Water beetles of China, Vol. III. Zoologisch-Botanische Gesellschaft in Ö sterreich and Wiener Coleopterologenverein, Wien.

臺灣產扁形豆龍蝨屬（鞘翅目：龍蝨科）回顧

劉興哲

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摘要: 本研究根據收集來自博物館和實地調查的標本，回顧臺灣產的扁形豆龍蝨屬 *Platynectes* Straneo, 1939 並提供臺灣產扁形豆龍蝨屬的檢索表。兩種扁形豆龍蝨分佈海拔高度存在差異，馬場氏扁形豆龍蝨 *Platynectes babai* Satô, 1982 分布較高 (海拔 750–2000 公尺)而條紋扁形豆龍蝨 *Platynectes gemellatus* Šťastný, 2003 則分布較低 (海拔 50–1200 公尺)，除此之外本文亦記錄在旱季時馬場氏扁形豆龍蝨可以進入潮濕的泥土裡度過枯水期。

關鍵字: 龍蝨科、龍蝨、水生昆蟲、生物學、臺灣

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http://zoobank.org/urn:lsid:zoobank.org:pub:21F73F68-8688-4DDE-9923-A9BC7A8689EF

再次發現澳門最小的豆娘 — 橙尾細蟌 （蜻蜓目：細蟌科）

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摘要: 橙尾細蟌 *Agriocnemis pygmaea* Rambur, 1842 是澳門已知最小的蜻蜓目 (Odonata) 物種，自1993年後本種就無採集紀錄，直至本研究在27年後再次發現橙尾細蟌，並討論該物種在澳門的紀錄、分佈和出沒季節。

關鍵詞: 都市棲地、淡水、水生昆蟲、生物多樣性

澳門產橙尾細蟌 *Agriocnemis pygmaea* Rambur, 1842 只於 1993 年 9 月 10 日被 Emmett R. Easton 博士在澳門路環島記錄過 (Eastern & Liang, 2000)，其後未曾有進一步的紀錄 (Wilson & Zaifu, 2007)，而且原紀錄中也沒有指出橙尾細蟌在澳門的棲地偏好。2020 年 4 月 12 日和 4 月 15 日作者群在澳門龍環葡韻濕地 (22.150 °N, 113.558 °E) 再次發現橙尾細蟌 ，本次觀察為 27 年後的第一筆紀錄，根據發現地點龍環葡韻的環境顯示，該地點是開闊的淡水濕地生態系統 。

圖、橙尾細蟌 *Agriocnemis pygmaea* Rambur, 1842 及龍環葡韻濕地棲地環境。

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引用文獻

Easton, E. R. & Liang, G. Q. 2000. The Odonata of Macao, southern China. *Notulae Odonatologicae* 5 (6): 75–80.

Wilson, K. D. & Zaifu, X. 2007. Odonata of Guangdong, Hong Kong and Macao, South China, part 1: Zygoptera. *International Journal of Odonatology* 10 (1): 87–128.

Rediscovery of the Smallest Damselfly in Macao, *Agriocnemis pygmaea* (Odonata: Coenagrionidae)

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Abstract: *Agriocnemis pygmaea* Rambur, 1842 is the smallest species of Odonata in Macao. There are no further records of this species in Macao after 1993. The present study provides an account of the rediscovery of this species after 27 years, and discusses their literature records, distribution and seasonal activity in Macao.

Key words: Urban habitat, fresh water, aquatic insects, biodiversity

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